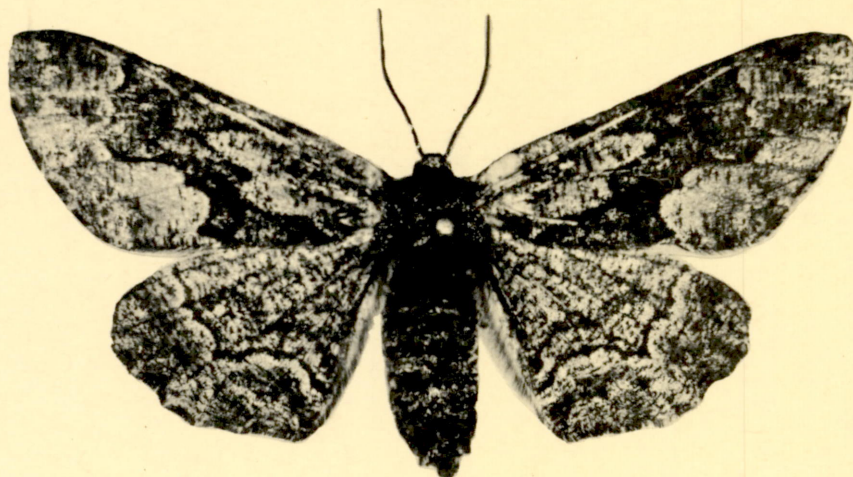


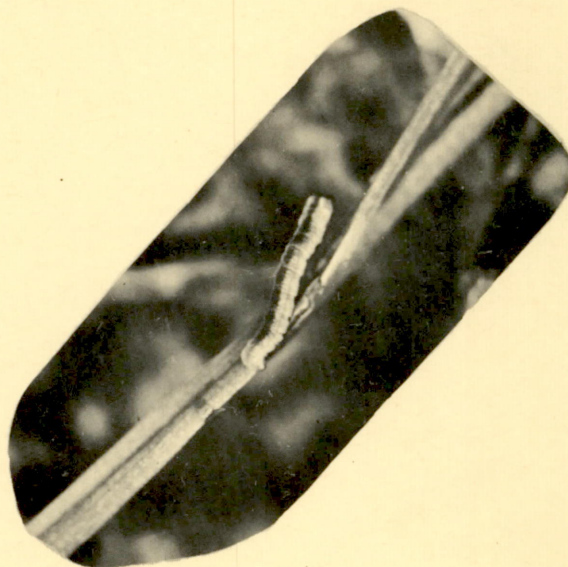
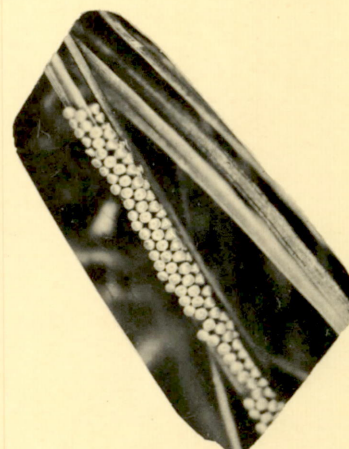
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**A PINE LOOPER,
PHAEOURA MEXICANARIA
(GROTE), OUTBREAK IN
EASTERN MONTANA**



U.S. DEPARTMENT OF AGRICULTURE-FOREST SERVICE
DIVISION OF STATE AND PRIVATE FORESTRY
NORTHERN REGION • MISSOULA, MONTANA

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A PINE LOOPER, PHAEOURA MEXICANARIA (GROTE),
OUTBREAK IN EASTERN MONTANA

By

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Forest Insect and Disease Branch

INTRODUCTION

A large geometrid, Phaeoura mexicana (Grote),^{1/} caused moderate to heavy defoliation on approximately 25,000 acres of ponderosa pine, Pinus ponderosa variety scopulorum on the Custer National Forest near Ashland, Montana, and the Northern Cheyenne Indian Reservation near Lame Deer, Montana, during the summer of 1969.

This is the first record of this insect in Montana, although it has been collected in several western States, including Idaho, Wyoming, South Dakota, and in British Columbia. It has never previously been reported as a pest, but as an incidental insect occurring in small numbers. The host was unknown until 1962 (Grant 1962).^{2/}

HOST AND DAMAGE

The host of P. mexicana in eastern Montana is ponderosa pine. Larvae feed on both old and new foliage, showing no apparent preference for one over the other (Fig. 1). Feeding begins at the distal end of the needle, often progressing to the sheath (Fig. 2). All crown levels and age classes are defoliated.

Of the 25,000 acres of aerially visible defoliation, about 4,000 are heavily defoliated (nearly all foliage stripped) and 21,000 acres moderately defoliated. Heavy defoliation was observed at three locations--Cook Mountain, Beaver-Stacey Divide, and near the Crazy Head Recreation Area (Fig. 3). The most severe defoliation occurred along ridgetops throughout the infested area.

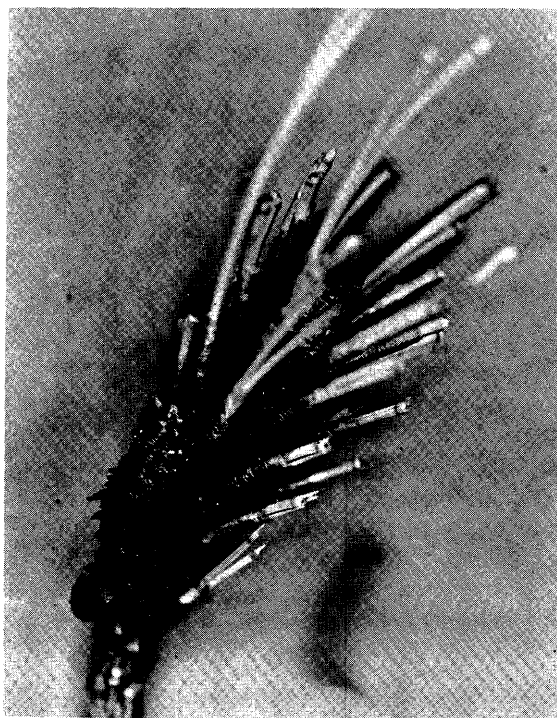
^{1/} Identified by Dr. W. C. McGuffin, Entomological Research Institute, Ottawa, Ontario, Canada, and D. C. Ferguson of the National Museum.

^{2/} Grant, J. Phaeoura mexicana (Grote) in British Columbia (Lepidoptera: Geometridae). Proc. Entomol. Soc. British Columbia, 59: 56. 1962.

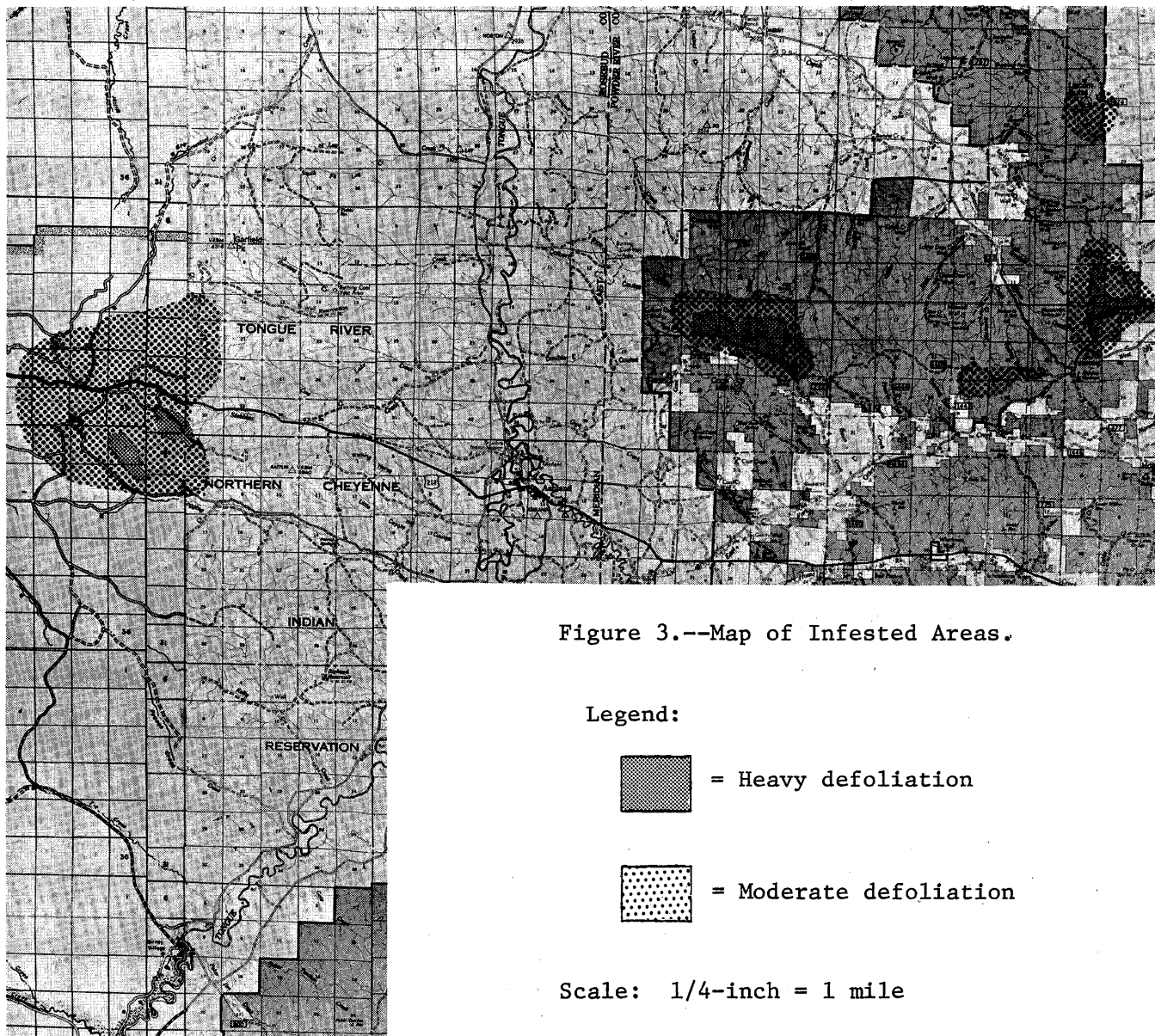


Figure 1.--Varying degrees of
looper defoliation.

Figure 2.--Feeding larva.



About 12 air miles separate the Cook Mountain and Crazy Head areas. Defoliation between the two areas was not observed; much of the distance is nontype.



DESCRIPTION

Rindge (1961)^{3/} gives a detailed description of the species. In brief, the adult female has a wing span of 1-3/4 to 2-1/2 inches. The male is slightly smaller (Fig. 4). The female has simple filiform antennae, the male's are bipectinate. Coloration varies considerably within the sexes. The overall color pattern is mottled brownish-gray, ranging from black to tan. The sex ratio of laboratory reared adult moths was 87 males and 120 females.

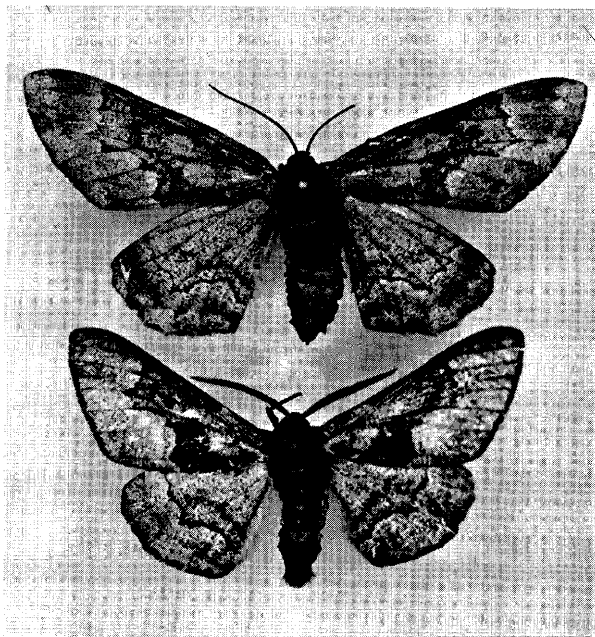


Figure 4.--Female (top) and male moths.

The eggs (Fig. 5) are nearly round and vary from 0.80 to 0.95 mm. in diameter. They are laid in clusters on the needle and may contain over 200 eggs. Five females examined had 278 to 480 eggs, with a mean of 345 eggs. The eggs hatch in about 12 days under laboratory conditions.

The larvae are brown with a very rough integument. When not feeding they suspend themselves by their prolegs from a twig, remarkably mimicking the twig (Fig. 6). Last instar larvae may attain 2 inches in length. Larval development is completed in the fall.

^{3/} Rindge, F. W. A revision of the Nacophorini (Lepidoptera: Geometridae). Bul. Am. Mus. Nat. Hist. 123: 91-153. 1961.

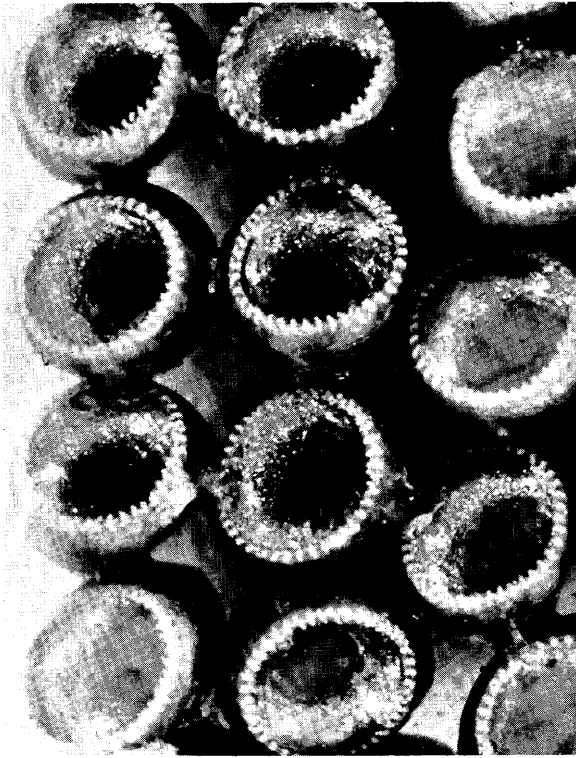
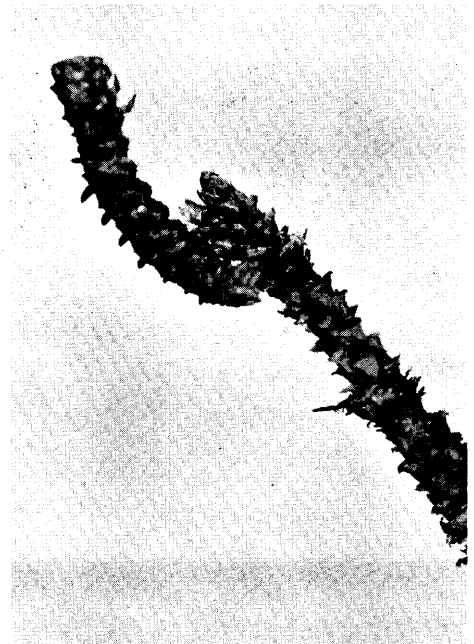


Figure 5.--Looper eggs.

Figure 6.--Larva extended from twig.



Pupae are stout and deep reddish brown in color. One hundred pupae ranged in length from 23.0 mm. to 32.5 mm., with a mean of 27.45 mm. The minimum and maximum widths were 6.2 mm. and 9.5 mm. respectively, with 8.07 mm. as a mean. Average weight was 0.9453 grams. Pupation occurs on the ground near the base of the tree in litter from 1 to 4 inches deep. Larvae make a slight indentation in the mineral soil under a layer of duff and pupate through the winter.

NATURAL CONTROL

A diversified complex of natural control agents appears to be exerting some control influence on the looper populations. Of the 2,015 pupae collected in the fall 1969, 680 (34 percent) were parasitized and 55 (3 percent) were malformed or diseased.

At least three species of parasites have been recovered from the pupae. Only two have been identified: Ichneumon pulcherior (Heinr.) (Fig. 7), and Euphorocera sp. near edwardsii (Will.), possibly a new species.^{4/}

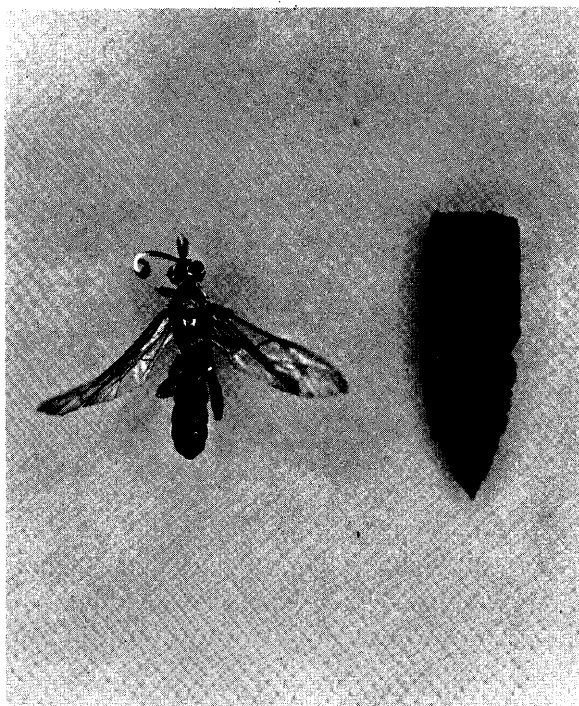


Figure 7.--Pupal parasite, I. pulcherior, and looper pupal case from which it emerged.

^{4/} Parasites identified by R. W. Carlson and C. W. Sabrasky of the National Museum.

Larvae showing typical virus disease symptoms were common in late August. Identification of the virus has not been made.

Diseased pupae collected in October were found to be infected with a common insect fungus, Paecilomyces farinosus.^{5/}

Wild turkeys feed heavily on the pupae. The ground in some areas appears to have been raked due to turkey scratching.

DISCUSSION

Because so little is known concerning this insect, we can only speculate on the future of the infestation. Square foot pupal samples were collected in late October to obtain an estimate of the overwintering population. Several widely scattered areas were sampled and pupae were found at the rate of 0 to 17 per square foot, with an average of about 4 per square foot. What this means in terms of next year's population is unknown, but it does indicate that there will probably be enough moths to continue the population for at least another season.

Rates of parasitism vary considerably from one area to another. Pupae collected near the Crazy Head Recreation Area showed 19 percent parasitism compared to over 70 percent parasitism for an area near the Beaver-Stacey Divide. Evaluations will be made in 1970 to determine population reduction by parasites.

Effect of continued defoliation of ponderosa pine is unknown. Some tree killing may occur if heavy defoliation continues again this year (1970). Moths flying in the spring will probably select trees with good foliage on which to lay their eggs. If this occurs, trees that received the heaviest defoliation in 1969 may not be heavily defoliated in 1970.

^{5/} Disease organism identified by Gerald M. Thomas. Univ. of California, Berkeley, California.